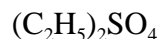


DIETHYL SULFATE

Diethyl sulfate is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 64-67-5



Molecular Formula: $\text{C}_4\text{H}_{10}\text{O}_4\text{S}$

Diethyl sulfate is a colorless, moderately viscous, oily liquid with a peppermint odor. It is miscible with alcohol and ether. Diethyl sulfate decomposes into ethyl hydrogen sulfate and alcohol upon heating or in hot water (NTP, 1991).

Physical Properties of Diethyl Sulfate

Synonyms: sulfuric acid diethyl ester; ethyl sulfate; diethyl sulphate

Molecular Weight:	154.19
Boiling Point:	209.5 °C
Melting Point:	-25 °C
Flash Point:	104 °C
Vapor Density:	5.31 (air = 1)
Density/Specific Gravity:	1.1774 at 20/4 °C (water = 1)
Vapor Pressure:	1 mm Hg at 47 °C
Conversion Factor:	1 ppm = 6.31 mg/m ³

(HSDB, 1991; Merck, 1983; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Diethyl sulfate is used as an alkylating agent, and to convert hydrogen compounds such as phenols, amines, and thiols to their corresponding ethyl derivatives. Diethyl sulfate can also be used in the preparation of intermediates and products in surfactants, dyes, agricultural chemicals, pharmaceuticals, and other specialty products (NTP, 1991). It has also been detected as a contaminant in thiophosphate insecticides (HSDB, 1991).

B. Emissions

No emissions of diethyl sulfate from stationary sources in California were reported, based on data obtained from the Air Toxics "Hot Spots" Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

No information about the natural occurrence of diethyl sulfate was found in the readily-available literature.

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of diethyl sulfate.

INDOOR SOURCES AND CONCENTRATIONS

No information on indoor sources and concentrations of diethyl sulfate was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

Diethyl sulfate exists in the atmosphere in the gas phase. No reactions of gas phase diethyl sulfate with O₃, NH₃, or water vapor have been observed. However, diethyl sulfate will react with the hydroxyl (OH) radical (Japar et al., 1990b). Because of its reaction with the OH radical, diethyl sulfate has a calculated half-life and lifetime of about 5.5 hours and 8 hours, respectively (Atkinson, 1995). Its reaction products include ethyl sulfate, hydrogen sulfate, and ethanol (Kao, 1994).

AB 2588 RISK ASSESSMENT INFORMATION

Diethyl sulfate emissions are not reported from stationary sources in California under the AB 2588 program. It is also not listed in the California Air Pollution Control Officers Association Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines as having health values (cancer or non-cancer) for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to diethyl sulfate are inhalation and dermal contact (NTP, 1991).

Non-Cancer: Exposure to diethyl sulfate may cause skin, eye, and respiratory tract irritation (HSDB, 1991). The United States Environmental Protection Agency (U.S. EPA) has not established an oral Reference Dose (RfD) or Reference Concentration (RfC) for diethyl sulfate. No information is available on adverse reproductive or developmental effects of diethyl sulfate in humans. Malignant tumors of the nervous system were reported in offspring of rats following a single subcutaneous dose to the pregnant females (U.S. EPA, 1994a).

Cancer: Excess mortality from laryngeal cancer was associated with occupational exposure to high concentrations of diethyl sulfate in an epidemiologic study. The U.S. EPA has not classified diethyl sulfate with respect to potential carcinogenicity (U.S. EPA, 1994a). The National Toxicology Program has classified diethyl sulfate as a substance reasonably anticipated to be a carcinogen based on sufficient evidence in animals and limited evidence in humans of carcinogenicity (NTP, 1991). The International Agency for Research on Cancer (IARC) has placed diethyl sulfate in Group 2A: Probable human carcinogen (IARC, 1992). The State of California under Proposition 65 has determined that diethyl sulfate is a carcinogen (CCR, 1996).

